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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,778	10/12/2005	Ziya Ramizovich Karichev	U 015717-4	4420

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EXAMINER	
LAIOS, MARIA J	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/16/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

nyuspatactions@ladas.com

Office Action Summary	Application No.	Applicant(s)	
	10/530,778	KARICHEV ET AL.	
	Examiner	Art Unit	
	MARIA J. LAIOS	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9, 13-27* is/are rejected.

7)☒ Claim(s) *10-12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment filed 21 July 2009. Claim 1 has been amended and claim 27 has been added.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The claim rejections under 35 USC 112, second paragraph is withdrawn. Applicant's remarks clarify the definitions of nickel-ruthenium alloy and N4-complexes on a carbon carrier.

Claim Rejections - 35 USC § 102

4. The claim rejections under 35 USC 102(b) as being anticipated by Gregory for claims 1-3 and 6 are withdrawn because claim 1 has been amended.

Claim Rejections - 35 USC § 103

5. The claim rejections under 35 USC 103(a) as being unpatentable over Gregory for claim 2-9 and 13-26 are withdrawn because independent claim 1 has been amended.

6. Claims 1, 4 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196).

As to claim 1, Tirrell discloses a fuel cell comprising an anode, a cathode, comprising a gas diffusion cathode (11) with a catalyst (col. 5 line 64-68); an electrolyte chamber with two distinct electrolytes (13-liquid electrolyte and 10,10a -membrane electrolyte); the liquid electrolyte (13) positioned between the anode and the cathode) and comprises an alkaline solution of potassium hydroxide (col. 6 lines 44-47) and the cathode catalysts is a non platinum catalysts (col. 5 line 64-74). Tirrel discloses the fuel cell uses fuel that is either a liquid or a gas (col. 1 lines 12-15) however Tirrel does not disclose the fuel cell as an alcohol-air fuel cell. Finkelshtain et al. teaches that fuel cell which consume liquid fuels are in general simpler than gases for storage, handling and transportation (Paragraph 8). Also, Finkelshtain et al. teaches that fuel cells that use direct oxidation of liquid fuels are less complex fuel regulation systems than indirect oxidation of fuels. Furthermore Finkelshtain et al. teaches that methanol is cheap, has a high specific energy and most commonly used liquid fuel (paragraph 9). For these reasons it would have been obvious to one of ordinary skill in the art at the time of the invention to have a direct alcohol fuel cell with the electrolyte system of Tirell because Finkelshtain et al. teaches that a liquid fuels are simpler to store, handle and transport and direct oxidation fuel cell are less complex than gas systems.

As to claim 4, Tirrel teaches the membrane electrolyte as an anion exchane membrane (col. 3 lines 59-60).

As to claim 27, Tirrel teaches the membrane electrolyte is disposed between the liquid electrolyte and the anode (figure 2).

7. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Gregory (US 3,553,022).

As to claims 2 and 3, Tirrel discloses a membrane but does not disclose the membrane as an asbestos matrix impregnated with an alkaline electrolyte.
Gregory discloses a fuel cell and teaches the electrolyte is a solid, a molten paste or liquid (col.1 lines 45-50) and also teaches the electrolyte to be an alkaline (col. 4 lines 60-70). Gregory also teaches the electrolyte as an aqueous potassium hydroxide trapped in an asbestos matrix (col. 5 line 50--52). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the membrane of Tirrel with the asbestos matrix which is impregnated with alkaline solution as Tirrell teaches the art equivalent member of the electrolyte.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Xing et al. (Hydrogen/Oxygen polymer electrolyte membrane fuel cells (PEMFCs) based on alkaline doped polybenzimidazole (PBI).

As to claim 5, Tirrel modified by Finkelshtain et al. teaches an anion exchange membrane in a fuel cell but does not disclose the membrane as a polybenzimidazole doped with OH ions.

Xing et al. discloses a polymer electrolyte membrane fuel cell and teaches the use of PBI doped with an alkaline solution and teaches it exhibits a high ionic conductivity (lines 1-6 of Conclusion section) and that it is cheaper (line 1-4 of Introduction section). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the membrane of modified Tirrel with a membrane doped with alkaline solution of Xing et al. because it is cheaper and has a high ionic conductivity.

9. Claims 6 and 7 rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Gregory et al. (US 3,553,022).

As to claim 6, Tirrell modified by Finkelshtain discloses an electrode (1) but does not disclose the cathode as a bilayered gas diffusion electrode. Gregory discloses a fuel cell and teaches the electrode can be made by a hydrophilic layer next to the electrolyte (col. 2 lines 65-72). Gregory teaches the application of the polymer allows for control and reaction interfaces of the fuel cell (col. 2 lines 4-6). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have a hydrophilic barrier toward the electrolyte because the allows for the control and reaction interface of the materials in the fuel cell.

As to claim 7, Tirrell modified by Finkelshtain discloses an electrode (1) but does not disclose the cathode as a bilayered gas diffusion electrode. Gregory discloses a fuel cell and teaches the use of a hydrophobic surface contacts the reactant gas (col. 2 lines 22-25. Gregory teaches the biporous electrodes avoid flooding and consequent blocking of the pores. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the concept of Gregory in the fuel cell of modified Tirrell because Gregory teaches this would avoid flooding and blocking of the pores.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Kordesch et al (WO 2001/39307 A2) and Choi et al. (US 2003/0198853 A1).

As to claim 8, Tirrell discloses an electrode but does not disclose a bilayer electrode having an active layer comprising 3-7 weight percent of a fluoroplastic and a membrane comprising polybenzimidazole.

Choi. discloses an anode for a direct methanol fuel cell and teaches the anode include PTFE (polytetrafluoroethylene, a fluorolplastic) in the amount of 10 weight percent (Paragraph 67). While Choi et al.fails to teach the specified amounts of PTFE, it has been held that "generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical" (MPEPE 2144.05), that “the normal desire of scientists or artisans to improve upon what is already

generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" (MPEP 2144.05), and that "[w]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" (MPEP 2144.05). Choi teaches the amount of PTFE is adjusted to impart a suitable viscosity for coating the slurry. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the anode of Torrell with the anode of Choi because Choi teaches the amount of PTFE can be adjusted to bring about a suitable viscosity for the coating of the slurry.

Kordesch et al. discloses a direct methanol fuel cell with a porous anode (26) having a membrane (40) coated on the anode as seen in figure 1. By placing the membrane on the porous anode it will act as a fuel separator between the anode and the cathode. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a layer of membrane of Kordesh onto the catalyst layer of Tirrel in order to further separate the anode and the cathode

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Kordesch et al(WO 2001/39307 A2) and Narayanan et al (US 6,485,851 B1).

As to claim 9, modified Tirrell discloses a fuel cell with an anode but fails to disclose a bilayer of an active layer comprising 2-7 weight percent of a polybenzimidazole and a membrane comprising polybenzimidazole.

Kordesch et al. discloses a direct methanol fuel cell with a porous anode (26) having a membrane (40) coated on the anode as seen in figure 1. By placing the membrane on the porous anode it will act as a fuel separator between the anode and the cathode. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a layer of membrane of Kordesh onto the catalyst layer of modified Terril in order to further separate the anode and the cathode

Modified Terrill discloses an anode and a membrane but fails to disclose the addition of polybenzimidazole to the anode.

Narayanan et al. discloses a liquid methanol fuel cell which includes polybenzimidazole (PBI, col. 4 lines 25-26) in a catalyst layer. Because this polymer would improve the wetting of the electrode (col. 4 lines 18-20) it would be obvious to include the PBI in the catalyst layer of Modified Terrill because this would improve the wetting of the electrode.

While Narayanan et al.fails to teach the specified amounts of PBI, it has been held that "generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical" (MPEPE 2144.05), that “the normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is

the optimum combination of percentages" (MPEP 2144.05), and that "[w]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" (MPEP 2144.05).

12. Claims 13 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Biberbach (6,814,777) and Richter (US 3,673,116)

as to claims 13, and 20-25, Tirrel teaches a fuel cell with various catalysts (col. 5 lines 65-75), however Tirrel does not disclose the anode as a system of nickel and ruthenium. Biberbach discloses the a Pt-Ru alloy that is an effective catalyst in a fuel cell system with the size of a Pt:Ru as 5.2 nm and a BET surface area of greater than 40 m^2/g (col.2 line 43, col. 7 line 8, in the table) and exhibits long term stability in DMFC (col. 7 line 3).

Richter discloses an effective catalyst for a fuel cell as Raney nickel aluminum molybdenum (col. 1 lines 42), which is more effective than Raney nickel alone (col. 1 line 45). It would have been obvious to one of ordinary skill in the art to combine the Pt:Ru and the Raney Ni-Al-Mo with the appropriate compositions in order to make an effective and optimal catalyst for a fuel cell.

It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose *In re Kerkhoven 205 USPQ 1069, 1072.*

It has been held in the courts that when the general conditions of a claim are similarly disclosed in the prior art, it is not inventive to optimize general conditions as concentration. *In re Aller, Lacey and Hall, 105 USPQ 233,235.*

13. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Ozin et al (4,569,924).

Tirrell discloses a fuel cell as is discribed above but does not disclose the non platinum catalyst comprising a silver on a carbon carrier, the silver is 7-18 weight percent on the carbon carrier and the surface area is 60-80 m^2/g. Ozin et al. discloses a silver-carbon catalyst with a 0.1-15 weight percent (col. 6 lines 26-30) for use in a fuel cell as teaches that the size will determine the efficiency of the fuel cell (col. 7, lines 18-29) that shows by making the size/surface a result effect variable. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the silver –carbon catalyst of Ozin in the fuel cell of Tirrel because this increase the overall surface area of the silver in the electrode.

14. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) as applied to claim1, 4 and 27 above, and further in view of Solomon et al. (US 4,615,954).

As to claims 17 -19, modified Tirrel teaches a fuel cell with a cathode catalyst of various catalysts (col. 58-67) but does not disclose a pyropolymer on a carbon carrier with a 10-20 weight percent and a surface area of at least 60-80 m^2/g.

Solomon et al. discloses catalyst used for a gas diffusion electrode in which the catalyst is cobalt tetramethoxyphenyl porphyrin on carbon with a 5-25 percent of the catalyst and is an art equivalent catalyst of silver (col. 3 lines 30-40). Solomon et al. further discloses carbon having a BET surface area of 1000 m^2/g (col. 3 lines 15-20).

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the silver catalyst of Gregory with a cobalt tetramethoxyphenyl porphyrin – carbon catalyst because cobalt tetramethoxyphenyl porphyrin – carbon catalyst is an art recognized equivalent of silver as a fuel cell catalyst. See MPEP 2144.06.

15. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tirrell (US 3,152,015) in view of Finkelshtain et al. (US 2002/0142196) Biberbach (6,814,777) and Richter (US 3,673,116) as applied to claim 13 above and in view of Gregory (US 3,553,022), Kordesch et al (WO 2001/39307 A2) and Xing et al. (Hydrogen/Oxygen polymer electrolyte membrane fuel cells (PEMFCs) based on alkaline doped polybenzimidazole (PBI) and Narayanan et al (US 6,485,851 B1).

As to claim 26, modified Terrill teaches a single layer anode but does not disclose a three layer structure as claimed. Gregory discloses a porous anode with a catalyst coating as is shown in figure 1, with the following order:

(methanol mixture)- Porous structure - catalyst - (electrolyte)

Gregory fails to disclose an additional layer of membrane to the anode to form a three layer system in the order of:

(methanol mixture)- Porous structure - catalyst+PBI - layer filled with PBI- (electrolyte)

Kordesch et al. discloses a direct methanol fuel cell with a porous anode (26) having a membrane (40) coated on the anode as seen in figure 1. By placing the membrane on the porous anode it will act as a fuel separator between the anode and the cathode. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a layer of membrane of Kordesh onto the catalyst layer of Gregory in order to further separate the anode and the cathode.

Modified Terril further modified by Kordesch fail to disclose the membrane as PBI (polybenziadazole) or the catalyst as a mixture of PBI and catalyst.

Xing discloses a fuel cell and teaches PBI as a membrane doped in an alkaline solution (section 2.1). It would have been obvious to one of ordinary skill in the art to have the membrane of Xing in the system of modified Terril because the membrane is compatible with the system and further demonstrate a high ionic conductivity (section 4).

Narayanan et al. discloses a liquid methanol fuel cell which includes polybenzimidazole (PBI, col. 4 lines 25-26) in a catalyst layer. Because this polymer would improve the wetting of the electrode (col. 4 lines 18-20) it would be obvious to include the PBI in the catalyst layer of Terril because this would improve the wetting of the electrode.

While Narayanan et al. fails to teach the specified amounts of PBI, it has been held that "generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical" (MPEPE 2144.05), that “the normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" (MPEP 2144.05), and that "[w]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation” (MPEP 2144.05).

Allowable Subject Matter

16. Claims 10 -12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: As to claims 10 and 11, the closest prior art of record is Gregory which discloses a fuel cell for a direct alcohol air fuel cell but fails to disclose an anode which comprises a porous nickel band filled with polybenzimidazole and an active layer comprising 3-7 weight percent fluoroplastic or 2-7 weight percent polybenzimidazol. As for claim 12, the closest prior art of record is Kordesh which discloses a direct methanol fuel cell with an acid based electrolyte. The anode of Kordesh is described as an anode with an asbestos membrane but fails to disclose the

asbestos impregnated with PBI or the active later comprising the require amounts of fluoroplastic or PBI.

Response to Arguments

17. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA J. LAIOS whose telephone number is (571)272-9808. The examiner can normally be reached on Monday - Thursday 10 am -7 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795